

A Spatial Method for the Forecast of Agricultural Data

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Abstract: The methods for spatial data analysis are often based on the assumption of stationarity of the estimated parameters (Besag, 1974; Cressie, 1991). This hypothesis is patently violated when the data are characterized by information relative to predefined but unknown sub-groups of the reference population. It is clear that for spatial data which follow this hypothesis, the main analytic issue is, not to estimate the model parameters or to introduce a structural dependence among observations, but to identify the geographical units where the parameters model is stationary. We refer to such situation as local stationarity.

The main purpose of this paper is to present a spatial model for the forecast of agricultural data. In particular, we propose an approach based on the Simulated Annealing algorithm (Geman and Geman, 1984). Furthermore, we describe an application of the proposed algorithm for the forecasts of the yield of durum wheat in 2004. Our aim is to produce a map of potential yield for durum wheat through a regression using three purely geographical covariates, the x and y coordinates and the elevation, and on an agro-meteorological model estimated yield (SAM model). The assumption of non-stationarity for agricultural data largely improves the obtained results in terms of R-square index.